

ART. VI. CHANGES IN BIRD LIFE AT PYMATUNING LAKE,
PENNSYLVANIA

BY RUTH TRIMBLE

(PLATES VIII-XI)

In the eight years that have elapsed since the watercourses of Pymatuning Swamp in Crawford County, Pennsylvania, and Ashtabula County, Ohio, were dammed to create Pymatuning Lake, the ecological picture of the region has been greatly changed. The purpose of this paper is to outline the changes that have occurred in the bird life of the region as a result of converting a great forested swamp into a vast expanse of open water. The most outstanding developments are naturally those involving species that are directly affected by the presence of water, and only these species will be discussed at the present time. The clearing of the forest has destroyed much of the habitat formerly utilized by many woodland species and has thereby greatly reduced the numbers of this component of the avian population. Bird-lists made during the period from 1932-1940 indicate, however, that the usual species still occur in the wooded areas that are intact. How greatly the modified ecological conditions will affect the boreal species that breed there remains to be seen.

George M. Sutton, in a complete report on the bird life of Pymatuning Swamp,¹ estimated that the original swamp accommodated more nesting pairs of birds per square mile than any area of equal size in Pennsylvania. His total list of 244 species (137 breeding species) included those observed within Pymatuning Swamp and at Conneaut Lake as well. Most of the records of water birds applied to Conneaut Lake, where waterfowl were occasionally abundant as migrants but rare as summer residents. The small, open ponds of Pymatuning Swamp—Crystal Lake, Mud Lake, and Dollar Lake—did not attract water birds in any numbers. The absence of mud-flats and sandy beaches accounted for the dearth of shore-

¹ *Annals Carnegie Museum*, vol. 18, p. 19-239, pls. 2-10, 1 map (March 31, 1928).

bird records. It was assumed that most of the migrating waterfowl passed over the area completely in an uninterrupted flight from Lake Erie to the Atlantic Coast. In comparing present conditions at Pymatuning Lake with those of the former Pymatuning Swamp, I have excluded all Dr. Sutton's records that applied to Conneaut Lake and have considered only those made within the swamp proper. Only in consequence of great changes in ecological conditions has it been possible to add to Dr. Sutton's comprehensive investigations.

Each year since 1932, when the impounded water first began to rise, we have watched with acute interest the development of Pymatuning Lake. To R. L. Fricke, of the Carnegie Museum staff, was delegated the task of making collections and observations of its avifauna. Mr. Fricke's extensive records, gathered primarily for incorporation in W. E. Clyde Todd's "Birds of Western Pennsylvania" (1940), have with Mr. Todd's permission been utilized in this report. Messrs. Todd and Fricke have likewise co-operated generously and enthusiastically with the writer on many of her numerous excursions to Pymatuning Lake to study its birds. Grateful acknowledgment is made to them and to Burt L. Oudette, representative of the Pennsylvania Game Commission and keeper of the refuge at Linesville, who has also assisted greatly in advancing these studies. Many friends have participated in numerous field-trips to Pymatuning Lake, and their enthusiastic interest has contributed to the success and enjoyment of the work. The Pennsylvania Game Commission kindly supplied the engraving for the map used as a frontispiece in this paper. The illustrations have been reproduced from photographs taken by Mr. Fricke.

The dates and localities of field-trips undertaken by the writer are as follows: 1933: May 19-20, Linesville; May 21-22, Hartstown. 1934: April 17-19, Linesville, Springboro, and Shermansville; May 22-25, Linesville, Hemlock Island, and Hartstown. 1935: May 15-18, Linesville and Hartstown. 1936: May 18-20, Linesville and Hartstown; June 6-7, Hartstown, Linesville, and Andover; July 12, Linesville and Andover; October 23, Jamestown, Linesville, and Hartstown. 1937: April 5-7, Linesville and Hartstown; April 10-11, Jamestown, Linesville, Andover, and Hartstown; May 17-22, Linesville, Shermansville, and Hartstown; November 6-7, Hartstown, Linesville, Shermansville, and Jamestown. 1938: April 23-24, Linesville; May 27-30, Hartstown and Linesville; August 25-26, Hartstown, Shermansville, and Linesville; October 13, Linesville. 1939: October 28, Jamestown and Linesville. 1940: April 6,

Jamestown, Andover, and Linesville; April 27-28, Jamestown, Andover, Linesville, and Hartstown.

Pymatuning Lake has attracted many students of birds, and they have recorded in current ornithological journals numerous important observations. In addition, a great fund of manuscript notes has been submitted to Mr. Todd for use in his book, and these have most generously been placed at my disposal. The chief contributors have been: Willard Dilley, Grant M. Cook, Lawrence E. Hicks, Howard M. McQuiston, Burt L. Oudette, Stanley J. Seiple, and Merit B. Skaggs. The observations of the group as a whole have covered every season of the year, so that there has been ample data for analysing the status of each species. Published records are indicated in the text by the year of publication in connection with the name of the authority.

THE ORIGIN AND CHARACTER OF PYMATUNING SWAMP

For many years Pymatuning Swamp invited the attention of naturalists and ecologists who recognized in it a unique natural laboratory for the investigation of ecological succession in one of the few remaining "bog-type" areas in the eastern United States. Located mainly in Crawford County, Pennsylvania, it extended slightly across the eastern boundary of Ashtabula County, Ohio. In configuration like a great horseshoe, about sixteen miles in length, the swamp stretched northward from Adamsville through Hartstown and west of Shermansville; it curved west and northwest south of Linesville, and then bordered the Shenango River in a narrow belt south to the Espyville-Andover road. In area the swamp covered about twenty-five square miles.

Geological studies (Leverett, 1902 and 1934; Hice, 1903) have revealed that in preglacial times the streams of western New York, Ohio, and western Pennsylvania drained to the north and northwest as far as the present basins of Lake Erie and Lake Ontario. Pymatuning was then a valley in this northward drainage. The glaciers, travelling southward across the region, dammed the outlets of the ancient streams and forced them southward into new channels; the thick deposits of glacial drift and the recessional moraines converted the valley into a large postglacial lake. In the thousands of years that have elapsed since then, the lake has gradually filled in, "partly because of washed-in material, but mostly because of the encroachments of the plant associations bordering its margins.

As the plants that were adapted to shallow water thrived and added their detritus to the edges of the lake, they built up, as it were, a false shore-line, consisting of a dense mat of vegetation. In this floating mat the plants of less wet habitats could, in turn, succeed in establishing themselves. Thus, as fast as the pioneer species built the shore-line farther out in the lake, behind them dry-land plants came in to establish a swamp forest.² Three small open lakes—Crystal, Mud, and Dollar—remain as reminders of the much larger body of water that in former years covered the entire area, and illustrate in the vegetational successions around their margins the process of development from an open-water succession through bog forest and alder-sumac association to swamp forest of hemlock and red maple, and finally the climax forest of sugar maple and beech.

Within the confines of Pymatuning Swamp, natural conditions provided for the continued existence of northern plants—relicts of a northward-moving vegetation—and an appreciable number of bird and animal species of northern affinities. According to O. E. Jennings (1927), the topography of the land previously covered by the ice, with its undrained or poorly drained kettle-holes and other depressions, is favorable for the retention of boreal islands of vegetation. In time, however, these islands slowly disappear. He believes that the tardy disappearance of the Pymatuning bog may, in part, be due to cool spring waters that feed into the deep depressions. The sphagnum-tamarack bog harbored the pitcher plant (*Sarracenia purpurea*) and sundew (*Drosera rotundifolia*), the calla (*Calla palustris*), clintonia (*Clintonia borealis*), cranberry (*Vaccinium macrocarpon*), cassandra (*Chamaedaphne calyculata*), and several rare bog orchids. The boreal component of the avifauna was expressed by such breeding species as the Yellow-bellied Sapsucker (*Sphyrapicus v. varius*), Slate-colored Junco (*Junco h. hyemalis*), Grinnell's Water-Thrush (*Seiurus noveboracensis notabilis*), Brown Creeper (*Certhia americana familiaris*), and Red-breasted Nuthatch (*Sitta canadensis*). This northern element was limited to isolated areas that were slowly but surely being superseded by a Carolinian, or southern, fauna and flora. Botanical studies of the original swamp have been made by A. Dachnowski (1912), O. E. Jennings (1913-15), John Bright (1916), W. R. Van Dersal (1933), and L. E. Hicks (1934). As previously stated, a complete report on the bird life of the area was published by George M. Sutton (1928).

² Netting, M. G., and W. R. Van Dersal, *Cardinal*, vol. 3, p. 152 (January, 1934).

HISTORY OF PYMATUNING LAKE³

Although the natural features of Pymatuning Swamp and the preservation of its original biota were of primary interest and importance to the scientific minority, more utilitarian-minded persons entertained a different view. The earliest suggestions for developing the swamp to "benefit mankind" dealt largely with the possibility of draining it to improve highways and to provide land for agricultural pursuits. The first drainage proposal on record was made in 1843. By an act of the General Assembly of Pennsylvania in 1868 a survey was made of the practicability of "reclaiming" Conneaut and Pymatuning marshes. No further action was taken at that time, but again in 1907 legislation authorized the State Highway Department to determine "the best course and method of making channels for draining the same [Pymatuning Swamp] and improving the highways therein . . . provided, however, that the plans shall be approved by the Water Commission." The drainage plan submitted was protested on the ground that the swamp was a valuable storage area and helped to maintain the flow of the Shenango River in dry weather. The Water Supply Commission refused to approve the drainage plan, and at its suggestion was provided by an Act of Legislature in 1911 with an appropriation to examine into the feasibility of a reservoir project. Upon the Commission's favorable report, the Legislature in 1913 passed the "Pymatuning Dam Act," which authorized establishing a reservoir by the construction of a dam at the outlet of Pymatuning Swamp. Subsequent legislation dealt largely with appropriations for the acquisition of lands. The State of Ohio also passed enabling legislation for the purchase by public subscription of the Ohio lands (a little more than 5000 acres) that would be affected by the proposed reservoir. The total land areas acquired for the Pymatuning reservoir project are as follows:

	Acres
Area in Pennsylvania.....	20,050
Area in Ohio.....	4,740
Total.....	24,790
Area to be flooded.....	16,730
Area not flooded.....	8,060

³ Condensed in part from the report of the Chief Engineer, Charles E. Ryder, in *Proceedings Engineers' Society of Western Pennsylvania*, vol. 48, no. 5, p. 103-140 (May, 1932).

In 1925 the control of the Pymatuning Reservoir Project was transferred from the Water Supply Commission to the Department of Forests and Waters. By an amendment in 1931 to the Pymatuning General Act, provision was made that "the reservoir and land surrounding it acquired by the Commonwealth in connection with the project, or portions of such reservoir and land, may be developed and used for fishing, hunting, game refuges, recreation, park or other purposes; provided, such use or uses will not, in the opinion of the Water and Power Resources Board, materially interfere with the primary purpose of the reservoir for conserving the water entering Pymatuning Swamp and regulating the flow in the Shenango and Beaver rivers." About this time also the original plan for a single dam was modified to include a secondary dam to be formed by the railroad and highway embankment that cross the reservoir south of Linesville. The secondary, or upper, reservoir was designated as a wild-life refuge. To increase its efficiency in this respect, provision was made for constructing a spillway to maintain a constant water level of 1,010 feet in this portion of the reservoir. The area includes 2,500 acres of water and marsh as well as 1,170 acres of land, where no clearing has been undertaken. The upper reservoir is only a few feet in depth except where the old stream beds cut through. The shallow margins have an abundant growth of aquatic plants essential as food and cover for waterfowl. Many small islands, some several acres in extent, provide feeding and nesting sites within the sanctuary. Credit for maintaining this area as a wildlife refuge goes to former Governor Pinchot, the Pennsylvania Fish and Game Commissions, and many individuals and organizations interested in conservation. On Ford Island, which is accessible from the road south of Linesville, the Game Commission has built a small museum, where a number of locally collected specimens of waterfowl are exhibited. Control of the refuge has been vested in the Pennsylvania Game Commission.

The entire area is posted against trespassers, although permission to enter may be received upon application to the Commission. Hunting in the refuge is, of course, prohibited at all times, but it is permissible on the lower reservoir during the prescribed open seasons. The State of Ohio, through its Conservation Commission, has also established several refuges on the west shore of the lower reservoir.

The construction of the main dam near Jamestown, Pennsylvania, was begun on October 6, 1931. Clearing the forest was started on January 11, 1932, under the able direction of R. J. Ferris. The gate of the upper dam was closed December 5, 1933, and that of the main dam on January 23,

1934. The two reservoirs have a capacity of 64,275,000,000 gallons. The lower reservoir is subject to fluctuating level as the need arises for drawing off water during the dry weather to maintain a normal flow in the Shenango River.

The completed reservoir covers an area of 16,420 acres, or 25.7 square miles. It is 16 miles long and 1.6 miles in average width (2.2 miles maximum width, where the highway crosses from Espyville, Pennsylvania, to Andover, Ohio); it has a shoreline of 70 miles and a maximum depth of 35 feet. It is now the largest lake in Pennsylvania, being almost eighteen times the size of Conneaut Lake; in water-area it exceeds Lake Chautauqua in New York by almost 3,000 acres. About one quarter of Pymatuning Lake is located in the State of Ohio.

PYMATUNING LAKE AS A WATERFOWL REFUGE

The conversion of a forested swamp into a 16,000-acre lake with a 70-mile shore-line has provided entirely different ecological conditions and has set the stage for a variety of new events. Netting and Van Dersal (1934) attempted to forecast the future of the region from the standpoint of its fauna and flora. Aside from expressing an opinion that the waterfowl population would increase, they offered no specific data on the changes in the bird life.

When Pymatuning Lake became a certainty, the ornithologically-minded hoped that it might become an important resting and feeding ground for migrating waterfowl. It lies directly on the route of the great Atlantic Waterfowl Flyway,⁴ which extends from the Atlantic Coast west to the Allegheny Mountains and curves northwestward across northern West Virginia, western Pennsylvania, and northeastern Ohio to the western end of Lake Erie. Many of the ducks and geese that breed in the North and in the interior of the Northwest follow this route in travelling to and from their wintering ground on the Atlantic Coast. Pymatuning Lake also lies not far distant from the Mississippi Flyway, another important migration route that extends through the Mississippi Valley eastward to Lake Erie.

Thus advantageously situated, the new lake has attracted migrating water birds in great numbers. More than that, it has become increasingly popular as breeding territory for a number of species. The extensive, irregular shoreline is interrupted by many small inlets and marshy bayous

⁴Lincoln, Frederick C., *The Waterfowl Flyways of North America*. U. S. Department of Agriculture Circular, no. 342, 12 p. (January, 1935).

that are ideal cover for waterfowl. About 8,000 acres of land bordering the lake are owned by the Commonwealth of Pennsylvania and the State of Ohio, and extensive areas in both states have been set aside as wildlife sanctuaries. Ducks of many species, such as the Mallard, Shoveller, Pintail, and Blue-winged Teal, that normally nest some distance from the water, profit from the upland areas in the refuge.

It is doubtful whether Pymatuning Lake will ever develop into a summer resort even in the portions that may be leased, because of the swampy, unstable character of the shore and the treacherous nature of the lake-bottom, covered as it is with stumps and debris from the clearing. Unpleasant as such conditions are for human tenants, they will aid in attracting and preserving wildlife. In this respect Pymatuning Lake will be greatly superior to Conneaut Lake, where people have long since crowded out the larger portion of the avian population.

The shallow waters of Pymatuning Lake permit the growth of lush aquatic vegetation along its margins. The swampy shores produce abundant stands of cat-tails (*Typha latifolia*), which grow out into the water to a depth of a foot. Interspersed with the cat-tails in the shallow water are several kinds of rushes (*Scirpus*), sedges (*Cyperus*, *Carex*), bur-reed (*Spharganium*), arrowhead (*Sagittaria*), pickerelweed (*Pontederia*), smart weed (*Polygonum*), Virginia arum (*Peltandra*), and others that are important factors among waterfowl food plants. In water from one to six feet deep are found the water willow (*Decodon verticulatus*), white water lily (*Castalia odorata*), purple water shield (*Brasenia schreberi*), and spatter-dock (*Nymphaea advena*), the seeds and tubers of which are eaten by many kinds of ducks. Growing on the bottom of the lake are important waterfowl foods such as pondweeds (*Potamogeton* spp.), wild celery (*Vallisneria spiralis*), waterweed (*Elodea canadensis*), and coontail (*Ceratophyllum demersum*). Duckweeds (*Lemna*, *Spirodela*) float on the water and densely cover the surface in many places; these tiny plants are themselves especially valuable as food for young ducks, and in addition harbor insect larvae, crustaceans, and mollusks that contribute to a balanced diet.

Comparison of Van Dersal's list of plant species for the Pymatuning region⁵ with McAtee's list of wildfowl food plants⁶ reveals that the native

⁵ Van Dersal, W. R., An Ecological Study of Pymatuning Swamp. (Doctor's Dissertation, M.S., University of Pittsburgh, 1933).

⁶ McAtee, W. L., Wildfowl Food Plants, p. i-x, 1-141, pls. 1-17, text-figs. 1-4 (Ames, Iowa, 1939).

growth includes 70 per cent of the plant families known to be utilized as food by waterfowl. The species already mentioned as occurring commonly at Pymatuning Lake are those that McAtee considers of prime importance. The abundance of a natural food supply is without doubt an outstanding factor in determining the extent of the waterfowl population of the lake. To supplement the natural growth until it becomes established, the Pennsylvania Game Commission has provided for artificial plantings of American lotus, wild celery, sago pondweed, floating-leaved pondweed, delta duck potato, bur-reed, pickerelweed, Pennsylvania smartweed, muskgrass, wampee, and water plantain. Most of these species, it may be noted, were already present in the area. Attempts to introduce wild rice (*Zizania aquatica*) have been unsuccessful. In the refuge fields bordering the lake, certain grains, such as wheat, corn, kaffir corn, buckwheat, etc., have been planted for feeding. Much of the grain is harvested and reserved for the peak flights in spring and fall, but at least a third of it is left standing in the fields, where it is accessible to the thousands of waterfowl that visit the region.

Numerous species of fish occur in the lake and are important dietary items for herons, egrets, bald eagles, and mergansers. There is an overabundance of carp in the reservoir, and their presence may have a harmful effect on the growth of the water plants. The damage they do consists in uprooting the bottom growth, and continued roiling of the waters cuts off the light and prevents the re-establishment of the vegetation. Carp have been seined from the lake in enormous quantities, and wire screening at the spillway tends to keep them from the Upper Lake. Many aquatic insects, crayfish, frogs, and snails also contribute to the local food supply for waterfowl.

Conforming with current terminology, I shall use the name Pymatuning Lake for this newly established body of water. The Pennsylvania refuge is the Upper (or Linesville) Lake.

WATERFOWL OCCURRING AT PYMATUNING LAKE

MIGRANTS

Pymatuning Lake thus provides a suitable habitat for waterfowl, and in the sanctuaries at least the birds are free from molestation by man. Beyond question, these are the factors that have permitted the development of the water-bird population. To the previous list of migrants at Pyma-

tuning Swamp have been added within a six-year period the following species:

Red-throated Loon	Ruddy Turnstone
Double-crested Cormorant	Hudsonian Curlew
Snowy Egret	Golden Plover
American Egret	Pectoral Sandpiper
Lesser Snow Goose	White-rumped Sandpiper
Blue Goose	Red-backed Sandpiper
European Widgeon	Eastern Dowitcher
Canvas-back	Marbled Godwit
Old-squaw	Northern Phalarope
White-winged Scoter	Ring-billed Gull
	Caspian Tern

Shore birds were formerly extremely uncommon in the Pymatuning region because of its unsuitability as a feeding ground. In the absence of sandy beaches or mud-flats and because of the abruptness of the shores and the thickness of the vegetation around the small lakes, most of the migrating shore birds passed over the area without stopping to feed or rest. Now, the situation has been altered, and the beaches and low-lying islands afford shelter that is sought by even the rarer migrants.

Certain species formerly considered stragglers to the region are now regular migrants:

Little Blue Heron
Whistling Swan
Duck Hawk
Black-bellied Plover

Unusual visitors that have fortuitously appeared at Pymatuning Lake in recent years are:

(?)Great White Heron	Western Willet
American Brant	Wilson Phalarope
	Red Phalarope

BREEDING SPECIES

Perhaps the most startling development in connection with the new lake is the increase in the number of breeding species. At the time Dr. Sutton published his report, breeding waterfowl were rare. There were a few records for the Mallard and Black Duck, species that now nest in great numbers at Pymatuning Lake. The Great Blue Heron, Pied-billed Grebe, and Blue-winged Teal, for which Dr. Sutton had no actual nesting records, now occur abundantly as summer residents, and many of their nests have

been examined in the course of our investigations. The Black-crowned Night Heron, previously considered a straggler, has become established in a thriving rookery. Dr. Sutton cited a single record of the Black Tern nesting at Conneaut Lake in 1910. A colony of a hundred or more has existed at Pymatuning Lake since 1934. The Common Tern, too, is apparently breeding there.

Among the ducks that have recently been found nesting are the Gadwall, Baldpate, Pintail, Green-winged Teal, Shoveller, Redhead, Ring-necked and Ruddy ducks. In several instances this development represents a considerable eastward extension of the normal breeding range. The easternmost breeding record for the Baldpate is from northern Indiana (Hogback Lake, Steuben County, May, 1889),⁷ but the species is not common east of the Mississippi River. For the Gadwall, the western shore of Lake Michigan is the normal eastern boundary of its breeding range, although Cooke⁸ reports one instance of its nesting at St. Clair Flats, Ontario. At the time John C. Phillips published his "Natural History of the Ducks" (1922-26) this was still considered an unusual and isolated occurrence. The Redhead has a comparatively restricted range in northwestern United States and southwestern Canada. Phillips cites early records (1880 and 1912) from St. Clair Flats, Michigan, as the easternmost breeding localities. Of its migration he says further (*l.c.*, vol. 3, p. 166): "In most of the area east of Lake Michigan the species is seen primarily or almost exclusively in autumn. It appears that the Redhead at this season takes a rather roundabout route going almost due east to reach its winter quarters on the Atlantic coast, while in spring a more direct line is chosen, up the Mississippi River Valley." At Erie Bay, Todd⁹ found it "a regular migrant, most numerous in the fall, but never abundant." Such has been its status in western Pennsylvania until our investigations at Pymatuning Lake in 1936 proved otherwise.

The normal breeding range of the Ring-necked Duck lies west of the upper Mississippi Valley, and its main migration route is along the course of this river. A limited number of Ring-necks migrate to the Atlantic

⁷ Butler, A. W., Birds of Indiana. *Indiana Department Geology and Natural Resources*, 22nd Annual Report, p. 601 (1898).

⁸ Cooke, W. W., Distribution and Migration of North American Ducks, Geese, and Swans. *Bulletin Biological Survey*, U. S. Department of Agriculture, no. 26, p. 27 (1906).

⁹ Todd, W. E. Clyde, Birds of Erie and Presque Isle. *Annals Carnegie Museum*, vol. 2, p. 518 (1904).

Coast by way of the Great Lakes, but until recent years the records for our region have been comparatively rare. The breeding of this species in western Pennsylvania was an unexpected development. The accepted eastern breeding limits were southwestern Ontario, northeastern Minnesota, and eastern Wisconsin. The breeding locality closest to our region is a recent one mentioned by Pirnie,¹⁰ who found Ring-necked Ducks nesting on the Upper Peninsula, Michigan, in 1928 and 1930. In connection with these records should also be mentioned the breeding grounds recently discovered (or rediscovered?) in Maine and New Brunswick.¹¹

Such species as the Shoveller, Ruddy, and even the Pintail have been known to breed irregularly in the East—whether as relicts of a former more extensive distribution, or as pioneers in range-extension is not apparent. Pymatuning Lake, as indicated above, is so completely disassociated from the recognized breeding territory occupied by the other above-mentioned species of ducks that the discovery of their nesting in western Pennsylvania is nothing less than sensational. The significance of these occurrences, which have been repeated in successive seasons, is not completely understood. It has been supposed from migration studies of waterfowl that lines of flight are traditionally inherent, not only for the species but for individual birds as well. "There appears to be a readily demonstrable natural law to the effect that, although groups of birds of the same species may share a common breeding ground, they are so strongly influenced by their ancestral lanes of migration that they will continue to follow them even though conditions en route or on the wintering grounds may become distinctly adverse to their welfare." (Lincoln, *l.c.*, 1933, p. 10). What hereditary nesting ground, then, has been forsaken by the species that have settled at Pymatuning Lake? If the Ring-neck, Red-head, and Gadwall once nested at Lake Erie, the Finger Lakes, or Conneaut Lake, the time is so long past that history has no record of it. It does not seem likely, therefore, that the Pymatuning incident is one of re-occupation of an ancient nesting territory. Some authors have suggested that the recent appearances of these western species in the Atlantic states may be a result of midwestern drought and dust-storms, which have followed extensive drainage and agricultural operations in what was once exceptionally favorable breeding territory. Another explanation,

¹⁰ Pirnie, M. D., *Michigan Waterfowl Management*, p. 26 (Lansing, Mich. (1935).

¹¹ Mendall, H. L., *Ring-necked Duck Breeding in Eastern North America*. *Auk*, vol. 55, no. 3, p. 401-404 (July, 1938).

perhaps, is that under protected conditions a favorable habitat will be populated regardless of prescribed ranges. May it then be supposed from this development that these waning species will utilize as breeding territory other refuges that conservationists may in time establish along the major flyways? If so, the course of events at Pymatuning Lake may have significant and far-reaching implications in the program of restoration and conservation of the fast-vanishing waterfowl of North America.

TABULATION SHOWING COMPARISON IN 10-YEAR PERIOD

A comparison of the present status of certain species with that which obtained at the time of Dr. Sutton's investigations follows:

Species	1928 Report	Present Report
Common Loon.....	Migrant	Migrant
Red-throated Loon.....	.....	Migrant (rare)
Holboell's Grebe.....	Migrant (rare)	.....
Horned Grebe.....	Migrant	Migrant
Pied-billed Grebe.....	Breeding (?)	Breeding (!)
White Pelican.....	Straggler (rare)	Straggler (rare)
Double-crested Cormorant.....	.....	Migrant
(?) Great White Heron.....	.....	Straggler (rare)
Great Blue Heron.....	Breeding (?)	Breeding (!)
American Egret.....	.....	Migrant (common)
Snowy Egret.....	.....	Migrant (regular)
Little Blue Heron.....	Straggler	Migrant
Eastern Green Heron.....	Breeding	Breeding
Black-crowned Night Heron.....	.....	Breeding
American Bittern.....	Breeding	Breeding
Eastern Least Bittern.....	Breeding	Breeding
Whistling Swan.....	Migrant (rare)	Migrant (regular)
Common Canada Goose.....	Migrant	Breeding (feral)
American Brant.....	.....	Migrant (rare)
Lesser Snow Goose.....	.....	Migrant
Blue Goose.....	.....	Migrant
Common Mallard.....	Breeding	Breeding
Common Black Duck.....	Breeding	Breeding
Gadwall.....	.....	Breeding
European Widgeon.....	.....	Migrant
Baldpate.....	Migrant	Breeding
American Pintail.....	Migrant	Breeding
Green-winged Teal.....	Migrant	Breeding
Blue-winged Teal.....	Breeding (?)	Breeding (!)
Shoveller.....	Migrant	Breeding
Wood Duck.....	Breeding	Breeding

Species	1928 Report	Present Report
Redhead . . . . .	.....	Breeding
Ring-necked Duck . . . . .	.....	Breeding
Canvas-back . . . . .	.....	Migrant
Greater Scaup Duck	Migrant	Migrant
Lesser Scaup Duck	Migrant	Migrant
American Golden-eye	Migrant	Migrant
Buffle-head	Migrant	Migrant
Old-squaw . . . . .	.....	Migrant
White-winged Scoter . . . . .	.....	Migrant
Ruddy Duck	Migrant	Breeding
Hooded Merganser	Breeding (?)	Breeding (?)
American Merganser	Migrant	Migrant
Red-breasted Merganser	Migrant	Migrant
Northern Bald Eagle	Occasional	Breeding
Osprey	Migrant	Migrant
Duck Hawk	Migrant (rare)	Migrant
King Rail	Migrant	Breeding
Virginia Rail	Breeding	Breeding
Sora	Breeding	Breeding
Yellow Rail . . . . .	.....	Breeding
Black Rail	Migrant (rare)	.....
Florida Gallinule	Breeding	Breeding
American Coot	Breeding (rare)	Breeding (common)
Semipalmated Plover	Migrant (rare)	Migrant (common)
Killdeer	Breeding	Breeding
American Golden Plover . . . . .	.....	Migrant (rare)
Black-bellied Plover	Migrant (rare)	Migrant (regular)
Ruddy Turnstone . . . . .	.....	Migrant
American Woodcock	Breeding	Breeding
Wilson's Snipe	Breeding	Breeding
Hudsonian Curlew . . . . .	.....	Migrant (rare)
Upland Plover	Breeding	Breeding
Spotted Sandpiper	Breeding	Breeding
Solitary Sandpiper	Migrant	Migrant
Western Willet . . . . .	.....	Migrant (rare)
Greater Yellow-legs	Migrant	Migrant
Lesser Yellow-legs	Migrant	Migrant
Pectoral Sandpiper	Migrant	Migrant
White-rumped Sandpiper . . . . .	.....	Migrant (rare)
Least Sandpiper	Migrant (rare)	Migrant (common)
Red-backed Sandpiper . . . . .	.....	Migrant
Eastern Dowitcher . . . . .	.....	Migrant
Semipalmated Sandpiper	Migrant	Migrant
Marbled Godwit . . . . .	.....	Migrant
Red Phalarope . . . . .	.....	Straggler (rare)

Species	1928 Report	Present Report
Wilson's Phalarope.....		Straggler
Northern Phalarope.....		Migrant
Herring Gull.....	Migrant	Migrant
Ring-billed Gull.....		Migrant
Bonaparte's Gull.....	Migrant	Migrant
Common Tern.....	Migrant	Breeding (?)
Caspian Tern.....		Migrant
Black Tern.....	Migrant	Breeding

Pymatuning Lake is, therefore, ecologically suitable for providing shelter, a natural food supply, and freedom from molestation for waterfowl. Twenty-two migrants and five accidental visitants have been added to the list of birds previously recorded from the region. Fifteen species have been added to the list of breeding birds, and the supposed breeding of three species has been verified.

ANNOTATED LIST OF SPECIES

Gavia immer immer (Brünnich). COMMON LOON.

The Common Loon was recorded by Sutton as "a regular, but never abundant, migrant." His records, mainly from Conneaut Lake, included only one from the Pymatuning region—Lower Lake, Hartstown, May 30, 1923. A few sporadic occurrences were reported from Hartstown between 1925 and 1932. Since 1935 this species has commonly been observed on Pymatuning Lake during the spring migration. Although most reports are of single birds or pairs, as many as seven have been seen at one time. The only fall record available is that of a single loon at the main dam near Jamestown, October 23, 1936 (Trimble). The shallow waters of Pymatuning Lake seem to be no deterrent for this diver. The earliest spring record is March 28, 1932, for Hartstown (Seiple); and the latest is May 20, 1937, for Linesville (Trimble).

Gavia stellata (Pontoppidan). RED-THROATED LOON.

The Red-throated Loon must be considered a rare and irregular migrant. There are but two records for Pymatuning Lake: Linesville, April 10 and April 20, 1938 (Bergner, 1938; Skaggs, 1938).

Colymbus grisegena holboellii (Reinhardt). HOLBOELL'S GREBE.

The only record of this rather rare migrant in the Pymatuning region is that given by Sutton from Crystal Lake, Hartstown, on May 13, 1922.

***Colymbus auritus* Linnaeus. HORNED GREBE.**

Sutton considered the Horned Grebe a regular migrant at Conneaut Lake and listed as well several occurrences at Crystal Lake, Hartstown. It is now regularly observed on Pymatuning Lake. Most of the records have been made in April (April 4-26); but there is one record for March 28, 1937, from Linesville (Skaggs) and one for the same locality for October 23 and 25, 1936 (Trimble; Skaggs).

***Podilymbus podiceps podiceps* (Linnaeus). PIED-BILLED GREBE.**

In Sutton's report the Pied-billed Grebe was listed as "a fairly common migrant," that "doubtless occasionally nests . . . but we have no certain breeding records for the Pymatuning region at the present time." The first evidence of its breeding was obtained by S. J. Seiple, who observed an adult with three young at Hartstown on July 21, 1931. Latterly the floating islands of Pymatuning Lake and the marshy cat-tail growth along its irregular shoreline have been superlatively attractive as nesting territory for this species. On May 29, 1934, R. L. Fricke collected a set of six eggs. Since that time many of the floating, shapeless mats of decayed aquatic vegetation that hold the eggs of the Pied-billed Grebe have been discovered. "The young birds are a very common sight, in summer, swimming and diving within plain view from the roads that cross the lake" (Trimble, 1937). The birds nest during the latter half of May; from five to eight eggs comprise the usual set. When the incubating bird leaves the nest, it covers the eggs with water-soaked vegetation.

***Pelecanus erythrorhynchos* Gmelin. WHITE PELICAN.**

The White Pelican is a rare straggler in the Pymatuning region. To Sutton's report of one "taken in May, 1905, at Pymatuning" we can now add the record of a pelican that remained on Pymatuning Lake, near Linesville, from June 19 until June 23, 1935 (Oudette, 1937). Its occurrence there, of course, is merely accidental, since the normal range of this species lies farther west.

***Phalacrocorax auritus auritus* (Lesson). DOUBLE-CRESTED CORMORANT.**

Since 1936 the Double-crested Cormorant has been seen each spring at Pymatuning Lake (Linesville); hence it may now be considered a regular, if not common, migrant. R. L. Fricke saw a single cormorant on June 20, 1936; on May 23, 1937, he observed five. On April 24, 1938, I saw a flock of six. B. L. Oudette reports having seen this species on numerous occasions. According to Mr. Todd, the June record does not imply breeding.

Ardea occidentalis Audubon. GREAT WHITE HERON.

Perhaps the most startling episode in the story of the bird life of Pymatuning Lake occurred at Linesville on May 14, 1938, when B. L. Oudette secured a specimen that has been identified as a Great White Heron. The normal range of the species is in peninsular Florida, and there are but few undoubted outlying records.

This unusual visitor was first detected by Mr. Oudette on May 11 in the sanctuary. The first judgment of the report, naturally, was that the specimen was an albino Great Blue Heron. Mr. Todd and I compared the mounted specimen with authentic examples of the Great White Heron and found the results puzzling indeed. Its size was somewhat smaller than that of the average given for *Ardea occidentalis* but within the limits for the species as a whole. The feathers of the crest were similar to those characteristic of *occidentalis*, and the legs were bright yellow in color. Later Dr. Harry C. Oberholser examined the mounted specimen and pronounced it (1939) an undoubted Great White Heron. Measurements as we found them were: bill, 142 mm.; wing, 438 mm.; tarsus, 175 mm. As given by Christy (1938) they were: bill, 5.75 inches; wing, 18 inches; tarsus, 8 inches.

Even more amazing than the specimen collected in May is a motion-picture record made on October 21, 1938, by C. Gordon Kriebel of an individual exactly like it at the same locality. The picture, according to Dr. Oberholser, substantiates Mr. Kriebel's claim that this bird also had the yellow legs characteristic of the southern species.

Although it is admittedly unwise to question the opinion of experts, this alleged occurrence of a species that is normally restricted to southern Florida and exceedingly rare elsewhere, naturally leads to the suspicion expressed by Mr. Todd (1940) that "it is possible that after all the Great Blue Heron is actually a dichromatic species (like certain other herons), with its white phase localized in southern Florida but appearing rarely and fortuitously in other parts of its range."

Ardea herodias herodias Linnaeus. GREAT BLUE HERON.

Sutton regarded the Great Blue Herons of the Pymatuning region as regular and fairly common migrants. He suspected that they might nest in the area but stated that "no nest with eggs has been found in the region to the best of my knowledge." Pymatuning Lake has certainly been a factor in the shifting of populations and in the increasing numbers of this species. From March until November the Great Blue Heron is a common

and spectacular figure, and occasionally a bird may linger through the winter months.

The first rookery in the vicinity was discovered by L. E. Hicks (1933) in the "Jumbo Woods," near Wing, Pennsylvania, in June, 1931. This rookery, according to local report, had been in existence for about fifteen years. In 1932 it contained twenty-one occupied nests; in 1933, according to Mr. Hicks, thirty-four nests were in use. A year or so ago the tract of timber was cut, and the heronry despoiled. Another rookery was located in the northwest corner of Pymatuning Swamp, near the property of J. G. Crumb. At the time of our first visit on May 19, 1933, it contained about fourteen nests, already occupied by young birds. In the following years, the colony increased to more than forty nests, but by 1938 it had broken up. In 1934 we examined a small rookery, consisting of eight or ten nests, about three miles north of Hartstown. The Great Blue Herons apparently have recognized the safety of the Pymatuning sanctuary, and there is now an extensive rookery within the refuge. According to B. L. Oudette, more than fifty pairs nested there in 1938. Access to the rookery is very difficult, so that there is little danger of the herons being disturbed. The usual time for nesting is during the latter half of April. We found young birds in the nests on May 19, 1933; but in 1937, when the spring season was cold and wet, the herons were obviously still incubating on May 18.

Casmerodius albus egretta (Gmelin). AMERICAN EGRET.

The first record of the American Egret in the Pymatuning region was made by S. J. Seiple (1930), who observed a single individual in the Hartstown marsh on July 26, 1929. From July 8 until September 10 in 1930, he watched one, and sometimes two, American Egrets on the same marsh (Seiple, 1931); but his most extensive observations were made during the season of 1933 (in Christy, 1934). The first arrival was seen on July 12, and during the ensuing months faithful watch of the area produced an interesting tally of dates and numbers of specimens. The dates range from July 26 until September 23, when a lone specimen was seen for the last time that season. The period of greatest abundance was in early August, and the maximum number of twenty-five birds was recorded on August 5.

The occurrence of American Egrets in the Pymatuning region was part of a widespread invasion in the northern states.¹² It can be attributed to

¹² Lyon, W. I., *Bulletin Illinois Audubon Society* (1931); Hicks, L. E., *Wilson Bulletin*, vol. 43, p. 268 (1931); and Christy, B. H., *Cardinal*, vol. 3, pp. 164-169 (1934).

an increase in the numbers of this beautiful species as a result of rigid protection in its southern breeding grounds.

For this tropical wanderer, Pymatuning Lake is an equally suitable and much more commodious stopping-place than the Hartstown marsh, which has accommodated fewer specimens in recent years. Willard Dilley (in Christy, 1934) reported a single American Egret in the flooded area near Espyville on September 29, 1933. In subsequent years, the American Egret population of Pymatuning Lake from July until September has steadily risen. It is estimated that at least one hundred and fifty birds occupied the area during August, 1938. I counted forty-five individuals flying to roost on a little island in the Upper Lake on the evening of August 26.

The late summer appearances of this species may normally be expected in suitable areas. Most of the birds are presumably young of the year—as attested by specimens collected at Hartstown in 1933—the invasion representing the normal postbreeding wandering. The significance of certain spring records remains to be determined. R. L. Fricke observed one egret near Linesville on May 14, 1934. I was a member of a party that detected another on May 17, 1935, in the same area. This was doubtless the same bird that was seen by Edmund Arthur (1936) on May 11 of the same year. It is not altogether unlikely that the American Egret may in the future choose Pymatuning Lake as a breeding station.

Egretta thula thula (Molina). SNOWY EGRET.

Like the American Egret, this smaller species has apparently profited from the efforts of conservationists. S. J. Seiple's record (1931) of a single Snowy Egret at Hartstown on August 1, 26, 28 and on September 10, 1930, seemed to indicate that then it might be accounted a rare visitor in our region. Much more gratifying are recent developments in the vicinity of Pymatuning Lake. Merit B. Skaggs (1937) observed one bird on September 27, 1936, and again on October 4, 1936, near Linesville. R. L. Fricke found several there on August 25, 1937; and on September 13, 1937, he collected two young males. Other published records for the same locality are by I. N. Boggs (1937), who reported two specimens on September 4, 1937; and R. T. Peterson (1938), who recorded two on September 18, 1937. Manuscript records include Willard Dilley's report of several Snowy Egrets on Linesville Creek, September 6, 1937, and my own personal observation of four in the refuge on August 26, 1938. On that date

B. L. Oudette told me he had counted eleven birds at one time during August.

In view of the above records, one may logically suppose that the area will continue to attract a growing number of Snowy Egrets, and that the species may now be considered an uncommon but regular visitant.

Florida caerulea caerulea (Linnaeus). LITTLE BLUE HERON.

The nomadic tendencies of the heron tribe bring many of its representatives north of their normal breeding ranges. Generally the birds observed in this postbreeding movement are immature. Such are the white-plumaged examples of the Little Blue Heron that are occasionally detected in our region. Sutton reported a single bird at Lower Lake, Hartstown, August 29, 1925. From the same area S. J. Seiple (1931) recorded two in company with the American and Snowy Egrets on August 1, 26, and 28 and on September 10, 1930. During August, 1935, L. E. Hicks observed one in the region of Pymatuning Lake. M. B. Skaggs (1937) saw one along the margin of the Lake near Linesville on September 27, 1936. At the same locality I saw three on August 26, 1938, in flight with several American Egrets and one Snowy Egret. Pymatuning Lake has become a mecca for this species as well as other members of its family. Thus far only the white-plumaged, or immature, examples have been observed.

Butorides virescens virescens (Linnaeus). EASTERN GREEN HERON.

Sutton considered the Green Heron an abundant migrant and summer resident in the Pymatuning region and recorded a number of nests in the vicinity of Hartstown. It is now commonly observed at Pymatuning Lake, which is in all ways well adapted for providing more extensive nesting territory and a corresponding increase in the numbers of this species. It arrives shortly after the middle of April and is common until the end of September. May is the usual time for nesting.

Nycticorax nycticorax hoactli (Boddaert). BLACK-CROWNED NIGHT HERON.

On the basis of four records—all from Conneaut Lake—Sutton termed the Black-crowned Night Heron a “rare summer resident, or possibly merely a summer wanderer.” During the spring of 1934 (April 2, Dilley; May 28, Fricke) adults were noted at Pymatuning Lake, near Linesville. The following year on May 18, R. L. Fricke observed an immature Black-crown. On May 14, 1936, one-half mile west of Linesville he discovered a

breeding colony that consisted of thirty pairs. During the summer of 1936, and indeed until October 24, these birds were commonly seen fishing in the waters of Pymatuning Lake, where they were particularly active at dusk. On May 17, 1937, we saw several at the site of the rookery west of Linesville, but it was not occupied that season. A new colony, however, was established within the sanctuary, and there were two others not far away. In 1938, according to B. L. Oudette, the Black-crown nests numbered approximately ninety. The birds were already nesting when we visited the area on April 24. The Lake, with its abundant supply of fish and small aquatic animals, and the safety of the refuge are the factors that have permitted the Black-crowned Night Heron to become established there as a breeding species.

Botaurus lentiginosus (Montagu). AMERICAN BITTERN.

"A common migrant throughout the region, and a locally abundant summer resident in the marshy areas of Pymatuning Swamp" (Sutton). The nests recorded by Sutton were found in the Hartstown region. L. E. Hicks (1933) reported finding two nests in the Ohio portion of the swamp on July 11, 1928. The creation of Pymatuning Lake has greatly extended the area suitable for colonization by the American Bittern, and field-work from 1933 until 1940 has indicated that the species is taking advantage of the new territory. Numerous nests have been found, and this bittern is common throughout the summer. It arrives in April, and nesting is underway by the middle of May. The latest fall record for Pymatuning Lake is October 23, 1936 (West, 1936).

Ixobrychus exilis exilis (Gmelin). EASTERN LEAST BITTERN. Pl. XI, fig. 2.

"A fairly common migrant and irregular and local summer resident in the marshy sections of Pymatuning In the cat-tail marshes of Pymatuning it was not detected prior to June 29, 1927, on which date several were noted, but no nests found" (Sutton). "Two nests with eggs were found in Pymatuning Bog [Ohio portion] on July 11, 1928" (Hicks, 1933). The open-marsh habitat created by the clearing and flooding of Pymatuning Swamp has reacted beneficially for the Least Bittern, and its numbers are increasing. This species is more secretive than the American Bittern, and its nest is not easily detected. R. L. Fricke's records, however, indicate that it is common as a breeding species. In June of 1936 he found eight nests containing either eggs or young; on June 19, three nests;

and on June 21, five nests. A set of five eggs collected on June 19 was half incubated. The Least Bittern nests later in the season than the American Bittern and apparently chooses a wetter and less accessible location.

Cygnus columbianus (Ord). WHISTLING SWAN.

"A rather rare and irregular migrant, which sometimes occurs in immense flocks, and then again may be absent for years at a stretch . . . On November 26, 1904, Mr. Kirkpatrick saw a flock near Linesville. . . . On December 21, 1924, a swan, believed to be of this species, was seen at Crystal Lake by Merl Hutchens and others . . . On April 1, 1925, several citizens of Hartstown observed a flock of seventeen at Crystal Lake" (Sutton). Each year since 1933 Pymatuning Lake has been a stopping-place during the spring and fall for scores of migrating Whistling Swans, so that now this species is a regular and fairly common transient. It is observed oftener in the spring; the earliest record for this season is March 10, 1936 (Oudette), and the latest, April 27, 1933 (Dilley). One bird that lingered for several weeks in May, 1935, presumably was injured. Fall occurrences are usually in October and November (October 28, 1934, Seiple; November 3, 1935, Skaggs; November 7, 1937, Oudette).

Branta canadensis canadensis (Linnaeus). COMMON CANADA GOOSE.

"A common and regular migrant . . . While these great birds customarily stop at Conneaut Lake, they are also often seen at Crystal and Lower Lakes, where they have been known to remain for several days at a time" (Sutton). The wide expanse of Pymatuning Lake has proved much more attractive than the tiny lakes of the old swamp, and every year since 1933 many migrating Canada Geese have stopped there to rest and feed. The Lake is directly on the course of the flyway from the wintering grounds on the coast of the southeastern states. In spring the main flights occur in March and April, although February records are not unusual. The return movement in the fall takes place during late October and November. Great flocks of geese sometimes alight to feed in grain fields many miles from the Lake.

In 1936, about fifty pinioned geese were released in the refuge by B. L. Oudette. These birds nested in the sanctuary in May, 1937, according to R. L. Fricke. Mr. Oudette reports finding nests in 1938 of birds fully able to fly; he supposed them to be progeny of the captive geese.

Branta bernicla hrota (Müller). AMERICAN BRANT.

The Brant is essentially a maritime species that seldom occurs on in-

land waters. B. L. Oudette's record (1936) of a flock of Brant on Pymatuning Lake near Linesville is, therefore, of unusual interest. On March 15, 1936, he saw four birds, and on the following day there were thirty-one. The Brant were in that part of the sanctuary where grain was being scattered as food for waterfowl. They remained in the vicinity until March 20. They may have been driven from their normal course by storms that prevailed a few days earlier.

Chen hyperborea hyperborea (Pallas). LESSER SNOW GOOSE.

The Lesser Snow Goose apparently passes through western Pennsylvania on its migration flights, but records of its occurrence are sufficiently rare to be noteworthy. "B. L. Oudette reports having seen a single snow goose in early March, 1938, at Pymatuning Lake and three on October 20, 1939" (Todd, 1940). The species in life could be confused only with the Greater Snow Goose, an Atlantic Coast form that is unlikely to occur so far inland.

Chen caerulescens (Linnaeus). BLUE GOOSE.

"The Blue Goose nests in Baffin Land and Southampton Island, and migrates along the east coast of Hudson Bay and though the Mississippi Valley to winter on the coast of Louisiana. Our region thus lies to the east of its regular route of migration" (Todd, 1940). B. L. Oudette (1937) reports this species on Pymatuning Lake from October 14 until October 23, 1936, the number of birds varying from seven to twenty. He observed several in the refuge on November 7, 1937; in early March of 1938 he saw seven; and he writes (1940) that "on Friday, October 20, [1939] while in the vicinity of Polick Bridge, north of Espyville, on the Pymatuning Lake, I flushed sixty Blue Geese." These and additional recent records from Lake Erie fix the status of this species as a semi-regular transient.

Anas platyrhynchos platyrhynchos Linnaeus. COMMON MALLARD.

Sutton listed the Mallard as "an abundant migrant, equally common in spring and fall, an occasional winter resident, and rather common summer resident, which has been known to nest in Pymatuning." The breeding records supplied by Dr. Sutton referred mainly to observations of broods of flightless young; only two nests—both from the Hartstown area—had been recorded at that time. Later, Dr. Sutton (1929) described two nests of eleven and nine eggs found near Shermansville in 1926.

As breeding territory, Pymatuning Lake is so much more satisfactory

and extensive than the old swamp that the Mallard population has multiplied tremendously since 1933. The first nests were found there by R. L. Fricke in May, 1934; and in the ensuing seasons numerous nests have been found in situations varying from low stumps and willow growth just above the level of the water in the shallow areas to marshy fields some distance from the shore. The usual time of nesting is in May, but April nestings are frequent, according to B. L. Oudette. Harold Bergner (1938) reports the finding of a nest with thirteen eggs on April 10. A great influx of Mallards during the fall migration augments the local breeding population. A waterfowl census taken in October, 1935, estimated the number of Mallards at 1190.

Anas rubripes rubripes Brewster. RED-LEGGED BLACK DUCK.

Anas rubripes tristis Brewster. COMMON BLACK DUCK. Pl. IX, fig. 1.

If there are two forms of the Black Duck, as indicated in the American Ornithologists' Union *Check-List*, both of them should occur in the Pymatuning region, *rubripes* as the wintering species and *tristis* as the breeding form. By some authors the character of red legs is considered solely a variation that depends on age. The two races are here considered as one.

Sutton produced evidence of the nesting of the Black Duck at Pymatuning Swamp near Hartstown. According to report, a nest with twelve eggs had been found in May, 1919; and during Dr. Sutton's field-work from 1923 until 1927, several broods of young were discovered. Pymatuning Lake is so well adapted for the Black Duck that it has taken possession of the area in great numbers. R. L. Fricke located the first nest for the Linesville region on May 15, 1934. Since that time many nests have been found, and during late May females with broods are a common sight. "In general, the Black Duck nests earlier than the Mallard. . . A brood of young was once noted as early as May 12 (1931)" (Todd, 1940). When we visited Pymatuning Lake on April 24, 1938, Mr. Oudette told us the Black Ducks were already nesting. My notes of nests examined on May 18, 1937, reveal a variety of situations: "one beside a stump on a floating island; one in a clump of willows on a high spot; one under a little pine at the edge of an island."

In the seasons of migration, the Black Duck is one of the most numerous species on the Lake. The spring flight usually begins early in March and continues through April. In the fall this species is most common in October and November and occasionally remains throughout the winter in stretches of open water.

Chaulelasmus streperus (Linnaeus). GADWALL.

Sutton regarded the Gadwall as "one of the rarest members of its family" and had no records for the Pymatuning region. Todd (1940) states that "its main breeding area lies in western United States and adjoining British Provinces. East of the Mississippi it is accounted uncommon even during the season of migration, and it is certainly one of the rarest ducks in western Pennsylvania at large."

It is somewhat surprising, therefore, that the first appearance of the Gadwall on Pymatuning Lake should be as a breeding species. On May 18, 1934, just west of Linesville, R. L. Fricke flushed a female Gadwall from a nest that contained ten eggs almost ready to hatch. On May 22 we visited the nest with Mr. Fricke and discovered that the brood had left, but two unhatched eggs remained in the nest. The eggs contained well-developed young Gadwalls, which were preserved for the Museum collection. The Gadwall has been observed in limited numbers during each subsequent summer. On May 27, 1935, Mr. Fricke saw a female with three young. I. N. Boggs (1939) reported a female and four young on May 22, 1938. On August 25, 1938, I saw a Gadwall fly from Ford Island, and on the following day flushed one from the western edge of the Lake at the old Padanarum Road. B. L. Oudette told me of two broods of nine and seven young birds that he had seen during the summer of 1938; and on June 23, 1939, he found a nest that held eleven eggs. The breeding of the Gadwall so far east of its normal range prompts one to believe that breeding ranges are not entirely a question of latitude and longitude, but rather selection of suitable habitat.

Mareca penelope (Linnaeus). EUROPEAN WIDGEON.

"This European duck was at one time thought to be of merely accidental occurrence on this side of the Atlantic, but in recent years so many American records have appeared that the latest authority¹³ is inclined to think that it may breed somewhere in our North Country" (Todd, 1940). There are a number of records of its occurrence in the Pymatuning region, both on Pymatuning Lake and at Hartstown. In chronological order they stand as follows: Linesville: one, April 26, 1936 (Seiple); one, October 23, 1936 (Trimble, *et al.*); one, March 27, 1937 (Skaggs); one, April 3, 1937 (Skaggs); four, April 6, 1937 (Trimble); seven, October 2, 1938 (Oudette). Hartstown: one, April 10, 1927 (Dilley); five, April 11, 1937 (Cook). The

¹³ J. C. Phillips, *A Natural History of the Ducks*, 1923, 2: 176.

European Widgeon is always associated with its American cousin, the Baldpate.

Mareca americana (Gmelin). BALDPATE.

Sutton listed the Baldpate as "a rather uncommon migrant," and gave one record (March 20, 1925) for Lower Lake, Hartstown. Pymatuning Lake lies directly in the path of Baldpates migrating from the Atlantic Coast to their breeding grounds in the interior of the Northwest, and it has thus become a popular stopping-place for this species. During the fall migration particularly, Baldpates are scattered over the Lake in thousands, October being the month of greatest abundance. In the spring they occur regularly but in somewhat smaller numbers, although on April 11, 1937, we saw at Hartstown a flock that must have contained a thousand or more. March 2 is the earliest date of arrival (Oudette), but the big flights are usually in April. The incident of the Baldpate breeding in the Pymatuning region was a great surprise, and involves a considerable extension of the previously known breeding range. When mated pairs were seen in the sanctuary on June 7, 1936, our suspicions were aroused. In July of that year B. L. Oudette told Mr. Todd of seeing adults with young. In late May of 1937 and 1938 paired adults were seen again; and on August 26, Mr. Oudette told me that he had observed three broods of young. The shallow waters of the new lake and its lush aquatic vegetation provide suitable food for this surface-feeder, and the marshy recesses of its irregular shore insure safe retreat for nesting.

Dafila acuta tzitzihua (Vieillot). AMERICAN PINTAIL. Pl. IX, fig. 2.

The American Pintail "breeds in Canada and the northern United States, commonly in the western parts, but only casually in the East" (Todd, 1940). Sutton found it common as a migrant in the Pymatuning region, since its migration flights between the Northwest and the Atlantic Coast carry it directly over the area. Pymatuning Lake now offers greater advantages than did the small lakes and watercourses of the original swamp. Moreover, the Pintail is one of those species that strangely enough have elected to stop far short of their usual goal and adopt the new lake as breeding territory. The first nests were found by R. L. Fricke in May, 1934, and the Pintail has been observed regularly in the summer of every subsequent year. It is one of the early migrants among the ducks (February 28, 1936—Oudette), and in the fall lingers well into November. It may even occasionally winter in limited numbers.

Nettion carolinense (Gmelin). GREEN-WINGED TEAL.

Sutton considered the Green-winged Teal a fairly regular migrant, although he had but few records for the small ponds of Pymatuning Swamp. As compared with the other species of ducks that now frequent Pymatuning Lake, it is by no means common. Our only actual evidence of its nesting there is that supplied by R. L. Fricke, who found a nest with an incomplete set of three eggs on May 25, 1936. No more eggs were deposited, and the nest was later abandoned. Mated pairs were observed late in May of the following year. L. E. Hicks tells me that in the Pennsylvania refuge, he has seen broods of young ducklings that were from one to two weeks old, and that he has numerous records of nests and young observed and collected along the Ohio shore. The first arrivals are generally noted in March (March 13, 1936—Oudette; March 25, 1937—Seiple; March 27, 1937—Skaggs); fall records are mainly for October (October 23, 1936—Trimble; October 25, 1936—Skaggs).

Querquedula discors (Linnaeus). BLUE-WINGED TEAL.

According to Sutton, the Blue-winged Teal has always been a common migrant in the Pymatuning region; and, having observed a female along the Shenango River in mid-summer, he suspected that it might breed in the area. L. E. Hicks (1935) considered it "local and rare" as a breeding species in the Ohio portion of the swamp, although more recently it has increased in numbers there. The new lake with its shallow bays and marshy areas provides for the Blue-winged Teal excellent territory that has been abundantly utilized. Commonly observed since 1933, this species was first found nesting on May 16, 1935, and since that time many nests have been located. They are placed in the tall grass of the tiny islands or in the waste fields that border the lake. The largest set of eggs was one of twelve that I found west of Linesville on May 21, 1937. The Hartstown marsh now supports a limited summer population.

The Blue-winged Teal is easily observed because of its tendency to frequent the shallow, marshy shores of the lake rather than the stretches of open water. In the spring it arrives in March (March 4, 1936—Oudette) and is very common until mid-April; teal seen thereafter may well be considered summer residents. In September, migrants swell the number of Blue-wings on the Lake, and by late October (October 23, 1936) the last have passed through.

***Spatula clypeata* (Linnaeus). SHOVELLER.**

Sutton considered the Shoveller a "rather rare transient" in the Pymatuning region. He suggested that it "may formerly have nested," but gave no records to substantiate the claim, which was evidently adduced from the fact that the species "formerly or occasionally" (A. O. U. *Check-List*, 1931) nested in western New York. The Shoveller breeds mainly in the prairie region of the Northwest and in the interior of the United States. W. W. Cooke (1906) and L. E. Hicks (1935) report its breeding on Lake Erie. It was noted on Pymatuning Lake in April of 1934 (Seiple), and when paired Shovellers were still present in May of the following year, nesting seemed to be indicated. To R. L. Fricke belongs the credit for finding the first nest on May 27, 1935. "In this case the Shoveller apparently was so enthusiastic about the new territory that to save time it moved in with a Ring-neck Pheasant. When the nest was found, it contained eight eggs of the Ring-neck and eight of the Shoveller" (Trimble, 1937). On May 27, 1936, Mr. Fricke located a typical Shoveller nest that contained ten eggs. It was situated in a tussock of high grass in a marshy area of an open field, some distance north of the Upper Lake. The breeding population has apparently increased within the last two years, although the Shoveller is by no means abundant even in migration, when it crosses the Pymatuning region in passing between its main breeding grounds and its wintering station on the south Atlantic Coast. The spring migrants arrive as early as the middle of March and are commonest in April; the return movement takes place during September and October.

***Aix sponsa* (Linnaeus). WOOD DUCK.**

The most important development with regard to the Wood Duck from the standpoint of the new lake and refuge is a gratifying increase in its numbers there. Since the Wood Duck prefers slow-running water and woodland conditions, it is much more generally distributed than other members of its family. Sutton reported it as a common migrant and locally a regular and common summer resident. He cited numerous instances of its nesting near the ponds at Hartstown, at Conneaut Lake, and also along French Creek and the Shenango River. The wooded sections that border Pymatuning Lake are well adapted to the breeding needs of this species. The Wood Duck's habit of nesting in hollow trees makes discovery of its nest rather difficult, but females with their broods are commonly seen during July and August. On June 6, 1936, we saw a female and twelve young on the Hartstown marsh. Three nests located

by R. L. Fricke in May, 1935, near Linesville, were in natural cavities in beech trees.

***Nyroca americana* (Eyton). REDHEAD.**

The Redhead is one of the many species of migrating waterfowl that cross our region diagonally in following the Atlantic Flyway from the main breeding grounds in the central and western parts of North America to a wintering station on the Atlantic Coast. The Redhead has suffered a great deal from the destruction in recent years of its hereditary breeding grounds in the prairie sloughs and marshes of the West, as well as from its popularity with duck hunters. Occasionally it is very numerous on Pymatuning Lake in the migration seasons, but usually it occurs in much smaller numbers than the other species of ducks. In the spring it is commonest during the last week of March and the first week or ten days of April; we saw a number of Redheads on April 11, 1937. The autumn migrants arrive in October and remain throughout November if there is open water.

Pymatuning Lake is far to the eastward of the normal breeding range of the Redhead, hence it was surprising, indeed, in 1936 to find it among the summer residents there. On July 2, Mr. Todd (1936) collected a few young ducklings to verify the breeding of this species, the females of which are easily confused with those of the Ring-necked Duck. No nests have yet been found, but it has been estimated that at least fifteen or twenty pairs have been present each summer since 1936. The Redhead "is a typical diving duck and seeks its food by plunging beneath the surface, sometimes descending to a considerable depth in search of the aquatic plants and animals which constitute its fare" (Todd, 1940). At Pymatuning it keeps out in the open waters of the lake, where it no doubt finds the deeper channel of the old Shenango River adequate for its method of feeding.

***Nyroca collaris* (Donovan). RING-NECKED DUCK.**

Although the Ring-necked Ducks that winter on the Atlantic Coast fly diagonally over the lake region of western Pennsylvania in passing from their breeding grounds in the Northwest, there are comparatively few records available. The normal breeding range of this species lies west of the upper Mississippi Valley. When the waters first began to rise in Pymatuning Lake, a few Ring-necks were observed (Linesville, April 5, 1933, and March 7, 1934—Dilley). In the following years these ducks were not uncommon, and in May of 1935 and May and June of 1936,

mated pairs were observed in the sanctuary. On June 19, 1936, R. L. Fricke discovered a brood with a female that he felt certain was a Ring-necked Duck. Since the females of this species are easily confused with those of the Redhead, Mr. Todd secured permission to collect some ducklings from various broods. These were taken on July 2, 1936, and proved conclusively that both the Ring-necked Duck and the Redhead were breeding at Pymatuning Lake. It was estimated that about fifteen pairs of the former were present during the summer of 1936. That this was not a sporadic nesting, is attested by the presence of equally as many summering pairs in 1937, 1938, and 1939. During the migration period the Ring-neck is now very common. On April 6, 1937, it outnumbered even the Scaups at the baited area in the sanctuary.

Nyroca valisineria (Wilson). CANVAS-BACK.

The Canvas-back is not a common species at Pymatuning Lake, although like a number of other ducks it crosses our region in its flights between the Atlantic Coast and its breeding grounds in the Northwest. It was first observed on Pymatuning Lake in 1935 (November 17—Skaggs). Since then it has been noted regularly in the spring and fall, although in limited numbers. An early spring date is March 6, 1936 (Oudette), and a late record for this season is April 26, 1936 (Skaggs). It will be interesting to ascertain whether the Canvas-back, like other "diving" species such as the Ring-neck and Redhead, will adopt Pymatuning Lake as breeding territory. At the present time there is no indication that such a condition exists.

Nyroca affinis (Eyton). LESSER SCAUP DUCK.

The Lesser Scaup is a regular migrant at Crystal Lake, Hartstown, according to Sutton. A female collected there on June 16, 1898 (not June 28, 1899, as recorded by Sutton) was not considered to be breeding. Since the creation of Pymatuning Lake, the Lesser Scaup has appeared there in increasing numbers during every migration season since 1934. It is common until the middle of May, and a few mated pairs have been observed as late as May 21 (1937). According to L. E. Hicks (1935), it is presumed to breed in Ashtabula County, Ohio, but he feels that individuals seen in the summer are probably not breeding. This species, like others of similar haunts and habits, however, is a potential summer resident. Conclusive evidence such as nests or broods of young, is not yet forthcoming; and in view of the tendency for non-breeding Scaups to linger on many of the

larger bodies of water in the East, these are the only dependable evidence.

In life the Lesser Scaup is not easily distinguished from the Greater Scaup (*Nyroca marila*), but, generally speaking, it is a later migrant in the spring.

***Nyroca marila* (Linnaeus). GREATER SCAUP DUCK.**

Both species of Scaup are common migrants in the Pymatuning region, although they are very difficult to distinguish in the field. Sutton records collecting a pair of Greater Scaups at Crystal Lake, Hartstown, on May 1, 1922; the specimens in question, however, are actually Lesser Scaups. The larger species is conceded to be an earlier migrant than *affinis* (Linesville, March 4, 1936—Oudette) and is apparently less common, although the paucity of records may be attributed to a laudable tendency to lump sight identifications under the indefinite heading of "scaup." Harold Bergner (1938) records both species at Linesville on April 10, 1938. The variable character of length of white wing-stripe (presumably more extensive in *marila*) and the color of the gloss on the head (green in the Greater; dull purple in the Lesser) are too elusive to count for much as field-marks.

***Glaucionetta clangula americana* (Bonaparte). AMERICAN
GOLDEN-EYE.**

Sutton considered the American Golden-eye a fairly common and regular migrant and occasionally a winter resident at Conneaut Lake. He cited E. E. Hunter as authority for records of it at Pymatuning in late February. Its status is much the same at Pymatuning Lake, where it has been observed in small numbers since 1934. Its apparent scarcity may be explained by its usual avoidance of shallow waters. It is commoner during the spring migration and is one of the first ducks to arrive (February 4, 1939—Oudette). Most of the migrants pass through in March, but we saw a number in the sanctuary on April 6, 1937, and on April 28, 1940; R. L. Fricke reports one female as late as May 27 in 1936.

***Charitonetta albeola* (Linnaeus). BUFFLE-HEAD.**

This handsome duck is a common and regular migrant in the Pymatuning region. It was so recorded by Sutton, who gave several instances of its occurrence on the small lakes at Hartstown. R. L. Fricke considered it very rare on Pymatuning Lake until 1936. Thereafter, however, it has been observed more frequently and in increasing numbers. M. B. Skaggs gives the following dates for the area near Linesville: November 17, 1935

(seven); April 19, 1936 (ten); April 26, 1936 (ten); November 15, 1936 (two); March 27, 1937 (six); May 8, 1937 (two). On October 23, 1936, we saw a few in the sanctuary; on November 7, 1937, we observed two females; on April 24, 1938, we found the species fairly numerous on the deeper waters of the Upper Lake; and on April 27 and 28, 1940, a few were observed there and at Hartstown.

Clangula hyemalis (Linnaeus). OLD-SQUAW.

This arctic and circumpolar species winters in the East along the Atlantic Coast and occasionally on the Great Lakes if there is open water. Sutton was unable to cite any records of it on the small lakes of Pymatuning Swamp. On April 6, 1937, we found one female among a flock of Scaups at the spillway near Linesville. The Old-squaw, of course, is a deep-water duck, which when it visits Pymatuning Lake usually remains far out in the open water where it is not easily observed. It probably occurs more frequently than our single record indicates.

Melanitta deglandi (Bonaparte). WHITE-WINGED SCOTER.

The White-winged Scoter winters on both the Atlantic and the Pacific coasts, as well as on the Great Lakes. In migration it is sometimes found on the smaller lakes, where it frequents the deepest water. The shallow waters of Pymatuning Lake are, therefore, not particularly attractive to this species. Sutton (1929) records the capture of a male from a flock of five scoters that alighted on Crystal Lake in the fall of 1928. Floyd Chapman (1937) reports a flock of seven observed on Pymatuning Lake near Linesville on May 16, 1936. This is the only scoter for which there are authentic records from this area.

Erismatura jamicensis rubida (Wilson). RUDDY DUCK. Pl. X, fig. 1.

Sutton found the Ruddy Duck common in migration at Crystal and Lower lakes, Hartstown. Its appearance on Pymatuning Lake in 1934, therefore, was not unexpected. The following year L. E. Hicks (1935) observed two broods of flightless young on the Ohio portion of the Lake. J. K. Terres told me of a brood that he had seen in the Linesville section in early July of that same year. On June 7, 1936, we saw eight male Ruddy Ducks in the deeper portion of the Upper Lake; and on June 19, R. L. Fricke found a nest with four eggs in a clump of bur-reed that was growing in about eighteen inches of water. The complete set of seven eggs was collected on June 22 and is the first to have been found in western Penn-

sylvania. The number of Ruddy Ducks summering at Pymatuning Lake has apparently increased slightly within the last few years.

This species breeds in most of the western states and as far north in western Canada as Great Slave Lake. Isolated instances of its nesting in the East are known from Michigan, New York, and parts of New England; its breeding at Pymatuning Lake is, consequently, not entirely unusual.

Lophodytes cucullatus (Linnaeus). HOODED MERGANSER.

The Hooded Merganser is widely distributed throughout the United States and southern Canada. In the breeding season it is not dependent upon large bodies of water for nesting sites but frequents wooded streams as well. The watercourses and small lakes of the original Pymatuning Swamp were well adapted for this species; but Sutton had no evidence of its nesting, although he found it to be a fairly common migrant. In recent years it has been a regular, if not particularly common, migrant at Pymatuning Lake. Most of the records are for March and April. May records are surprisingly scarce, and definite information to establish the breeding of the Hooded Merganser in the area is still wanting.

Mergus merganser americanus Cassin. AMERICAN MERGANSER.

The American Merganser occasionally visited the small lakes of Pymatuning Swamp during migration (Sutton). Since 1936 it has been fairly common at Pymatuning Lake during the spring migration, and rather less abundant in the fall. Most of the records are for March and April, but B. L. Oudette reports nine individuals arriving on February 10, 1939. On April 24, 1938, which is a rather late date for this species, Mr. Oudette and I saw a flock of a hundred or more fly over the Upper Lake. My only fall record is for October 23, 1936, at the dam near Jamestown.

Mergus serrator Linnaeus. RED-BREASTED MERGANSER.

Sutton cites spring migration records (March and April) for the Red-breasted Merganser from Lower Lake, Hartstown. S. J. Seiple observed it at Crystal Lake in 1926. It has been recorded at Pymatuning Lake regularly each spring since 1932. Most of the occurrences have been in late March (March 28, 1934—Dilley; March 29, 1934—Seiple). R. L. Fricke (1931) and M. B. Skaggs have both observed it during May, and a number of females were present at Jamestown and at Linesville on April 27 and 28, 1940. The area is not far removed from the normal breeding range ascribed to this species, and one might reasonably expect that it will in the future be found nesting at Pymatuning Lake.

Haliaeetus leucocephalus alascanus Townsend. NORTHERN BALD EAGLE.

Although Sutton believed that the Bald Eagle must formerly have nested in the Pymatuning region, he listed the species merely as an occasional visitor. During our investigations we saw Bald Eagles for the first time at Pymatuning Lake in the spring and summer of 1935. These newcomers were immature birds. In 1936 and 1937 there were at least two pairs in the sanctuary, and in the latter season B. L. Oudette found a nest. A bird as conspicuous as the Bald Eagle is not overlooked, and its predilection for prominent perches on dead stubs makes it easy to observe. An unailing food supply of fish, and freedom from molestation have attracted this all too uncommon species to the area. Although the breeding population is probably limited to a few pairs, the Lake is a focus for migrating eagles. On August 26, 1938, Mr. Oudette made good his boast that Bald Eagles in numbers I had never before witnessed would come to roost on the dead hemlocks of the islands in the Upper Lake. From our lookout on one of the small islands we could count twenty-one Bald Eagles in sight at one time; and as we left the island just at dusk, still another flew in to join the assembly. Some of these were immature birds, but a goodly number were white-headed adults. On a later date Mr. Oudette was able to raise his tally to twenty-eight. This remarkable development at Pymatuning Lake is indeed gratifying.

Pandion haliaëtus carolinensis (Gmelin). OSPREY.

The Osprey, according to Sutton, is a fairly regular and common migrant at Conneaut Lake, and he gives a record for September 8, 1925, from Crystal Lake, Hartstown. It was to be expected, therefore, that this species would appear at Pymatuning Lake. It has been observed there regularly in the spring during every year since 1935, although it is by no means common. No evidence of its nesting in the region has thus far been found.

Falco peregrinus anatum Bonaparte. DUCK HAWK.

"A rare and irregular transient" (Sutton). The facilities of Pymatuning Lake are much better adapted to this species than were the small lakes and watercourses of the old swamp. It is not common, however. R. L. Fricke observed one Duck Hawk on May 24, 1935. In 1938 I saw one in the sanctuary near Linesville on April 24 and again on August 26; according to B. L. Oudette, this bird had been present throughout the summer.

Rallus elegans elegans Audubon. KING RAIL.

"A rare and infrequently recorded migrant, which sometimes occurs locally in the summer and should occasionally nest, although we have no breeding record at present" (Sutton). S. S. Dickey found an adult with two young in the marsh near Hartstown on June 18, 1922. S. J. Seiple (1931) reported an adult and two young at the same locality in August, 1930. L. E. Hicks (1933) records "an adult with at least four young at Pymatuning Bog on June 16, 1931."

The King Rail is present also in the environs of Pymatuning Lake; it has been observed near Linesville each summer since 1934. At the latter locality on May 23, 1935, R. L. Fricke found a nest containing nine eggs, and definitely established the breeding of the King Rail in the Pymatuning region. Our earliest spring migration date at the Lake is April 13, 1934 (Dilley). The King Rail evidently remains quite late in the fall, since Mr. Oudette found a dead bird in December of 1937.

Rallus limicola limicola Vieillot. VIRGINIA RAIL.

Sutton found the Virginia Rail to be an abundant summer resident in the marshy cat-tail growth of Pymatuning Swamp near Hartstown. He located many nests on dates varying from May 4 until May 31. The cat-tail areas and open marsh that now border many parts of Pymatuning Lake are suitable territory for this rail, and a great number of nests have been found. Rails are so furtive in their movements that they are observed with difficulty, but their presence is quickly detected from their characteristic calls. The Virginia Rail seems to select a rather dry location for its nest. Complete sets contain ten or eleven eggs that are laid about the middle of May. The eggs of the Virginia Rail are lighter in color, less heavily spotted, and less glossy than those of the Sora. The young are hatched in early June (Blair Road, June 7, 1936). Rails suffer a great deal from predators, their common enemies being snakes, frogs, and turtles, which devour the eggs and young. Sutton refers also to the depredations by severe hailstorms.

Porzana carolina (Linnaeus). SORA.

As reported by Sutton, the Sora has long been a common summer resident in the cat-tail marshes near Hartstown, and there is as well an early (1895) nesting record for this species at Linesville. Like the Virginia Rail with which it is commonly associated, the Sora has profited from the increase of suitable open-marsh habitat in the vicinity of Pymatuning Lake.

The summer population of Soras probably outnumbers that of the Virginia Rail. Nests have been found every season since 1932. The usual time for full sets (usually 10 to 12 eggs) is during the latter half of May, although Sutton found newly hatched young on May 25, 1922. The local population is increased by the arrival of migrants in September, and C. A. Bergstrom gives November 7, 1928, as a late date for the species at Shermansville.

Coturnicops noveboracensis (Gmelin). YELLOW RAIL.

Sutton's efforts to find the Yellow Rail at Pymatuning Swamp were unsuccessful. L. E. Hicks (1933), however, reports on this species as follows: "No nests found but an adult seen in the Pymatuning Bog [Ashtabula County, Ohio], July 2, 1938, and an immature bird about half grown found dead at the same place on the Pennsylvania-Ohio line, August 9, 1932." The only other record for the area is that of one specimen observed by H. M. McQuiston two miles west of Linesville on October 6, 1934.

Creciscus jamaicensis stoddardi Coale. BLACK RAIL.

Sutton's report of a Black Rail observed along the southern shore of Crystal Lake, Hartstown, on September 7, 1925, still remains the only record at the present time. The scarcity of this species may be more apparent than real, for it is so seclusive that it may easily be overlooked.

Gallinula chloropus cachinnans Bangs. FLORIDA GALLINULE. Pl. X, fig. 2.

Sutton published the first account of the Florida Gallinule breeding in western Pennsylvania. He observed a family group at Lower Lake, Hartstown, on September 5, 1925, and on June 30, 1927, discovered the first nest of this species in the area. It was found "at the very edge of the channel of the Shenango river about four miles north of Hartstown." In May of 1931, R. L. Fricke (1931) found the Florida Gallinule common in the Hartstown marsh, and in August of that year S. J. Seiple (1931) observed a number of birds, including young. Two nests were located by Mr. Fricke in May, 1933; the first was practically a floating nest, and the second was in the cat-tails near the edge of the marsh. The Florida Gallinule, like so many other water-loving species, has taken advantage of the situation created by the formation of Pymatuning Lake. It is commonly observed there throughout the summer, arriving in late April and leaving in September or early October. A nest of nine eggs was collected by Mr. Fricke near Linesville on May 27, 1936.

Fulica americana americana Gmelin. AMERICAN COOT.

According to Sutton, the Coot nested near Hartstown, where he saw an adult accompanied by two young birds on May 31, 1923. The species was common as a migrant on the small lakes there. Since 1933 it has been observed on Pymatuning Lake. On May 22, 1934, Messrs. Fricke, Todd, and Dilley found four nests with sets of seven, three, and nine eggs. Other nests had just been started. They were in the flooded area that was grown over with cat-tails. Foundations of sticks supported nest linings of rushes and cat-tails. The nests were built up from four inches to a foot above the water, which was then about eighteen inches deep. L. E. Hicks (1935) reported the breeding of this species on the Ohio portion of the Lake in Ashtabula County. "In the two years following, coots became so numerous and their floating nests were so often and so easily found that they were no longer a novelty" (Trimble, 1937). There were hundreds of nesting pairs; during the seasons of migration the coots occurred in thousands; and some were even observed during the winter.

As the cat-tail growth, which practically covered the shallow lake from 1933 until 1936, was gradually flooded out except along the margins, the numbers of summering Coots fluctuated. The diminution was apparent in 1937, although a number of nests were found in the shallow places where the vegetation was more dense. According to B. L. Oudette, however, the coots had been absent from the Lake all summer during 1938, until we saw a raft of several hundred on August 26. They were common that season in the marsh at Hartstown, where their numbers have increased greatly since the time of Dr. Sutton's observations.

Charadrius semipalmatus Bonaparte. SEMIPALMATED PLOVER.

The Semipalmated Plover was considered by Sutton a "rather rare migrant" at the small lakes near the southern end of Pymatuning Swamp. The shores of Pymatuning Lake, its floating islands, and sandbars are much more ample as resting and feeding places for this migrant. In the spring it is fairly common from the middle until the end of May. The return movement brings it back about the end of July (Skaggs); it is common in August, and has been observed as late as October 14 (Seiple).

Oxyechus vociferus vociferus (Linnaeus). KILLDEER.

"Abundant as a migrant, common as a summer resident, and occasional in winter" was Sutton's estimate of the status of the Killdeer in the Pymatuning region. The statement is still apropos, for the species is one of the

most common and conspicuous members of the Pymatuning colony. An unusually early record of nesting is that of a set of four eggs found near Mr. Oudette's home on April 24, 1938. Another unusual record was a set of *seven* eggs in a nest found by R. L. Fricke on May 16, 1938, near Linesville.

Pluvialis dominica dominica (Müller). AMERICAN GOLDEN PLOVER.

The Golden Plover occasionally reaches western Pennsylvania in its southward migration, but spring occurrences are exceptional (Todd, 1940). The only record for the Pymatuning region at the present time is of a single specimen observed by S. J. Seiple near Linesville on October 8, 1938.

Squatarola squatarola (Linnaeus). BLACK-BELLIED PLOVER.

Sutton gives one record of this "rare and irregular migrant" at Crystal Lake on September 8, 1925. It can now be considered a regular migrant at Pymatuning Lake, where it occurs in both spring and fall, although never in large numbers. R. L. Fricke saw three birds on May 30, 1934. Other dates and authorities are as follows: three, May 29, 1935 (Fricke); two, June 2, 1935 (Fricke); twelve, August 20-21, 1935 (Hicks); eight, October 17, 1935 (Fricke); three, May 18-20, 1936 (Trimble, *et al.*); four, October 4, 1936 (Skaggs); October 23, 1936 (Trimble) and (West, 1936); thirteen, May 24, 1937 (Fricke).

Arenaria interpres morinella (Linnaeus). RUDDY TURNSTONE.

The Ruddy Turnstone was recorded by S. J. Seiple (1931) at Hartstown on August 16, 1930. "During migration it prefers the seacoast, but some individuals traverse the interior of the country and regularly visit the shores of the Great Lakes" (Todd, 1940). There are a number of reports of its occurrence at Pymatuning Lake: September 29, 1933 (Dilley); October 9, 1933 (Seiple); May 26, 1934 (Fricke); May 8, 1937 (Skaggs); May 24, 1937 (Fricke)—the last record was of a flock of seventy-five.

Philohela minor (Gmelin). AMERICAN WOODCOCK.

In 1928 Sutton wrote of the Woodcock in the Pymatuning region: "Today it is common only occasionally as a migrant and decidedly uncommon as a summer resident, save in a few favored localities. When Mr. Todd visited the Crystal Lake region in 1895 he found nesting Woodcocks amazingly abundant. Today only a pair or two remain of all that host." The diminution in numbers was attributed to excessive hunting, natural causes, and the increase of predators, as well as the gradual disappearance

of suitable habitat. Latterly the Woodcock seems to have regained some ground, and in the vicinity of Pymatuning Lake it is now considered a fairly common summer resident. The protection afforded by the new sanctuary has undoubtedly been an important factor in replenishing—even if slightly—the fast diminishing numbers of this interesting species.

Capella delicata (Ord). WILSON'S SNIPE.

Sutton found Wilson's Snipe a "common and fairly regular migrant and irregularly common and local summer resident at Pymatuning Swamp." He has published (1923) a full account of its habits as he studied them near Hartstown, where he located a number of nests. L. E. Hicks (1933), whose observations were made in the Ohio portion of the Swamp, found the Snipe fairly numerous there. "In 1928 a careful census on several successive evenings indicated that no less than fourteen pairs were breeding in the Ohio portion of the Pymatuning Bog or within three-quarters of a mile of the state line. In 1929 about sixteen pairs bred, in 1930 only six pairs were indicated, in 1931, eleven pairs, and in 1932, eight pairs." He observed young birds several times, and found one nest on Hemlock Island on May 30, 1931. The Snipe is still relatively common in the area. It is sometimes quite numerous in migration. Willard Dilley reported at least seventy-five birds in a short distance along Linesville Creek on October 14, 1933; and S. J. Seiple observed thirty-five a few miles north of Jamestown on October 12, 1934. Wilson's Snipe is an early migrant, arriving in March (March 8, 1925—Bergstrom; March 28, 1930—Seiple). Indeed, according to Sutton, it sometimes winters in the region. Fall migration dates are mainly for October. The numbers of Snipe fluctuate from year to year, but conditions at Pymatuning Lake seem more favorable for this species, which inhabits open marsh, low, overflowed meadows or the weedy growth along shore.

Phaeopus hudsonicus (Latham). HUDSONIAN CURLEW.

The Hudsonian Curlew is a rare and irregular transient in the region of Pymatuning Lake. "On May 23, 1937, G. M. Cook saw a flock of thirteen flying over Pymatuning Lake, north of Andover, Ohio. The following day R. L. Fricke counted twenty-three birds in a flock flying over the lake west of Linesville, calling vociferously" (Todd, 1940).

Bartramia longicauda (Bechstein). UPLAND PLOVER.

The Upland Plover was considered by Sutton a rather rare transient and a rare and very local summer resident in the region of Pymatuning

Swamp. He observed newly hatched young near Hartstown on June 2, 1922, and recorded a nest found by J. G. Crumb near Linesville about 1900.

The changed ecological conditions in the area make it more acceptable as breeding territory for the Upland Plover, which is now fairly common. The open, grassy fields that border some parts of the Lake are ecologically suitable for this species, which is primarily characteristic of the Great Plains. It arrives in April (April 9—Dilley; April 26—Skaggs), and by mid-July its southward migration is already underway.

Actitis macularia (Linnaeus). SPOTTED SANDPIPER.

The Spotted Sandpiper is widely distributed as a breeding species. Sutton did not find it common at Crystal and Lower Lakes "because the shores are not satisfactory as feeding or nesting-grounds." Pymatuning Lake is, of course, well adapted to the needs of this species, and the number of breeding pairs and migrants has greatly increased. The Spotted Sandpiper arrives after the middle of April (April 23—Dilley; April 26—Skaggs). In the fall migration it is most numerous in August, but a few stragglers have been recorded in October

Tringa solitaria solitaria Wilson. EASTERN SOLITARY SANDPIPER.

The Solitary Sandpiper is a common migrant, for which there are a few summer records, but as yet no positive evidence of its breeding. Sutton saw one bird in June, 1922, at Crystal Lake. He further recounts the actions of a mated pair observed from May 9 to 19, 1922; he believed they were searching for a nesting site. There are no recent June records, and July and August dates may pertain to migrating birds.

Catoptrophorus semipalmatus inornatus (Brewster). WESTERN WILLET.

The Western Willet sometimes strays eastward in migration, and Todd (1940) has recorded two specimens that were collected by W. D. Hunter on the edge of Pymatuning Swamp south of Linesville in early April of 1929.

Totanus melanoleucus (Gmelin). GREATER YELLOW-LEGS.

Sutton considered the Greater Yellow-legs a fairly common migrant in the Pymatuning region and gave records from Linesville, Shermansville, Hartstown, and Crystal Lake. The marshy shores of Pymatuning Lake are ideal feeding grounds for this species during its spring and fall migration. It arrives there early in the spring (April 6, 1937—Todd). Non-

breeding birds have been noted near Linesville in June by L. E. Hicks. The returning migrants appear in July (July 9, 1938—Seiple), and a late date for Linesville is November 7, 1937 (Trimble.)

Totanus flavipes (Gmelin). LESSER YELLOW-LEGS.

The Lesser Yellow-legs frequents the same kind of marshy shores that are chosen by its larger relative, *T. melanoleucus*. Sutton found it to be even commoner than the latter in the region of Pymatuning Swamp. In fact these two species were the only shore birds that regularly visited the small ponds of the swamp. The new lake now attracts these species in far greater numbers. The Lesser Yellow-legs arrives a little later in the spring (April 27, 1929—Seiple) and has completed its fall migration in October (October 14, 1933—Seiple).

Pisobia melanotos (Vieillot). PECTORAL SANDPIPER.

Sutton wrote of this species: "The wooded Pymatuning is altogether unsuitable as a feeding-ground." Pymatuning Lake, however, provides the overflowed fields, wet, grassy meadows, shallow pools, and mud flats that this species frequents during its migration through the area in spring and fall. It is common and regular there, flocks of from twenty-five to thirty individuals having been observed both by L. E. Hicks and M. B. Skaggs. The spring migration occurs in April and May (April 6, 1937—Todd; May 20, 1937—Trimble). The Pectoral Sandpiper reappears in July or August (July 30, 1937—Skaggs), and its fall migration is usually completed by the end of October (October 23, 1936—Trimble; and West, 1936).

Pisobia fuscicollis (Vieillot). WHITE-RUMPED SANDPIPER.

The White-rumped Sandpiper is rare in western Pennsylvania. There is but one record for Pymatuning Lake: a specimen collected by R. L. Fricke on May 8, 1929, near Linesville.

Pisobia minutilla (Vieillot). LEAST SANDPIPER.

Sutton considered the Least Sandpiper "a rather rare and irregular migrant, which occurs only along the muddy pools near the roads and in the open fields." He collected a male near Hartstown on May 13, 1922. During migration the Least Sandpiper is now regularly observed along the marshy shores and on the little sandbars and floating islands of Pymatuning Lake. It arrives in May (May 17, 1935—Todd; May 18, 1927—Seiple). In the fall migration it appears in late July or early August (July 30, 1937—Skaggs; August 5, 1935—Hicks) and all have passed through by mid-October (October 14, 1933—Seiple and Dille).

Pelidna alpina sakhalina (Vieillot). RED-BACKED SANDPIPER.

The Red-backed Sandpiper is one that frequents only the larger lakes and pools. Formerly it probably covered the distance from the Great Lakes to the bays and estuaries of the Atlantic Coast in a single flight and was for that reason unrecorded from the small ponds of Pymatuning Swamp. The changed conditions created by the new lake favor its occurrence there, and it has been seen near Linesville on a number of occasions: October 14, 1933 (Seiple); May 15, 1934 (Fricke); May 8, 1937 (Skaggs); May 20, 1937 (Trimble and Todd); October 23, 1936 (Trimble; and West, 1936).

Limnodromus griseus griseus (Gmelin). EASTERN DOWITCHER.

The Eastern Dowitcher usually migrates along the Atlantic Coast and is not common in the interior, but conditions at Pymatuning Lake favor its occurrence there in limited numbers. R. L. Fricke (1930) supplied the first record for the region. He observed three birds one mile south of Linesville on May 20, 1930, and collected a female. Mr. Fricke has seen this species in the same locality during May of 1933, 1934, and 1936, in numbers varying from one to a dozen birds. S. J. Seiple has recorded the Dowitcher at Hartstown on May 17, 1930 (three); on May 12, 1932 (one); and on August 1, 1930 (one).

Ereunetes pusillus (Linnaeus). SEMIPALMATED SANDPIPER.

During migration the Semipalmated Sandpiper occasionally visited the small lakes of Pymatuning Swamp, according to Sutton. He gave three records of its occurrence at Crystal Lake and Hartstown. S. J. Seiple (1931) supplies a record of five birds at the latter locality in August, 1930. This sandpiper is now regularly observed in the fall at Pymatuning Lake and occasionally appears there in the spring migration as well. I saw it on May 18, 1936, at Linesville. The return movement begins in July (July 9, 1938—Seiple) and continues into October (October 23, 1936—Trimble).

Limosa fedoa (Linnaeus). MARBLED GODWIT.

Sutton had no Pymatuning records for this rare straggler, although he reported two specimens that were taken many years ago at Conneaut Marsh and Edinboro Lake, respectively. More recently, W. D. Hunter collected two birds near Linesville on October 2, 1929. There have been no reports of the occurrence of this species since the creation of the new lake.

Phalaropus fulicarius (Linnaeus). RED PHALAROPE.

The Red Phalarope is primarily a pelagic species that breeds only in the far North. Its occurrence anywhere in the interior of the United States is unusual, as is L. E. Hicks's report of a female that he collected on the Ohio shore of Pymatuning Lake on July 16, 1937. Dr. Hicks has written me that the specimen is in breeding plumage and that the exact locality for it is "two miles north of the Andover Fill."

Steganopus tricolor (Vieillot). WILSON'S PHALAROPE.

The only authentic record of the occurrence of this Mississippi Valley species in western Pennsylvania has been supplied by R. L. Fricke. He collected a female near Linesville on May 15, 1934.

Lobipes lobatus (Linnaeus). NORTHERN PHALAROPE.

According to Sutton, three specimens of the Northern Phalarope were collected at Conneaut Lake. The species was first recorded at Pymatuning Lake by Harold D. Mitchell (1940), who observed one bird at close range near Linesville on October 7, 1939.

Larus argentatus smithsonianus Coues. HERRING GULL.

On the basis of several May records from Crystal Lake, Hartstown, Sutton considered the Herring Gull an irregularly common migrant at Pymatuning Swamp. It is now very common at Pymatuning Lake. There are records for this species in the winter (Andover-Espyville Road, January, 1934—Dilley; and Linesville, January 12, 1934—Seiple), and immature or non-breeding birds even linger through the summer months. The spring migration usually begins in February and extends into May (May 21, 1936—Todd). In the fall the Herring Gull is most numerous in September.

Larus delawarensis Ord. RING-BILLED GULL.

Apparently the Ring-billed Gull did not occur on the small lakes of Pymatuning Swamp, but it has been common every spring and fall at Pymatuning Lake since 1935. Some non-breeding birds remain there even throughout the summer (June 6, 1936—Trimble; July 2-4, 1936—Todd; July 9, 1938—Seiple). The spring migration takes place in April and May (April 5, 1937—Todd; April 10, 1937—Trimble). August marks the beginning of the reverse movement (August 5-8 and 20-21, 1935—Hicks). There are no wintering records for Pymatuning Lake; our latest fall record for the region is November 15, 1936 (Skaggs).

Larus philadelphia (Ord). BONAPARTE'S GULL.

"A regular and sometimes abundant transient visitant, occurring not only at Conneaut Lake, but at Crystal and Lower Lakes in Pymatuning and along all the larger water-ways" (Sutton). Pymatuning Lake is a favorite stopping-place for this gull on its migrations from the Atlantic Coast to northwestern North America. It is most abundant during April and May. On May 18, 1937, near Linesville, we saw a flock of about two hundred, all of which seemed to be young birds. The earliest spring date for the region is April 8, 1937 (Todd). A number of Bonaparte's Gulls were observed at the Jamestown Dam on October 28, 1939.

Sterna hirundo hirundo Linnaeus. COMMON TERN.

The Common Tern, according to Sutton, was common and regular as a migrant at Crystal Lake, Hartstown. Since 1926 a successful breeding colony has been maintained at Presque Isle, Erie. Pymatuning Lake has attracted this species each year since 1933, and many Common Terns have been observed there during the summer months (June 7, 1936—Trimble; July 2-4, 1936—Todd; August 5-6, 1935—Hicks). It is quite likely that the birds are breeding there, although no nests have yet been discovered. There is no great extent of sandy beach, such as this species prefers, but the many summer records are suggestive.

Hydroprogne caspia imperator (Coues). CASPIAN TERN.

The Caspian Tern was first noted at Pymatuning Lake in 1936 by M. B. Skaggs, who saw three on April 26. It was observed in May of that year by Messrs. Todd and Fricke. Its status is that of a transient, although S. J. Seiple reports a single tern of this species on July 9, 1938. The Caspian Tern is not common on the new lake.

Chlidonias nigra surinamensis (Gmelin). BLACK TERN. Pl. XI, fig. 1.

Sutton found the Black Tern a fairly regular and sometimes abundant transient on the small ponds and waterways of Pymatuning Swamp. He recorded (*fide* Welshons) the instance of its nesting at Conneaut Lake. A nesting colony of about fifty pairs was located in the region of Pymatuning Lake northwest of Linesville in May, 1934. On May 21, nesting was just beginning, and on May 30 Mr. Fricke collected a set of eggs. It was placed on water-soaked reeds and grasses floating on water that was about a foot deep. The type and location of this nest are typical of nests that were found in subsequent seasons. The young are flying by the end

of July (July 29 and 30, 1937—Skaggs). The Black Tern population of the Upper Lake has continued to grow, and the species is common also on the Hartstown marsh during the summer season. It is not an early migrant in the spring, May 8 (Skaggs) being the earliest date for the Linesville area. The species has disappeared from the Lake in September.

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